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**Defining long-term maintenance conditions of human embryonic stem cells with arrayed cellular microenvironment technology.**

**Journal:** Stem Cells Dev

**Publication Year:** 2009

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**PubMed link:** 19327010

**Funding Grants:** Combinatorial Platform for Optimizing Microenvironments to Control hESC Fate , Enhancing Facilities for Genetic Manipulation and Engineering of Human Embryonic Stem Cells at UCSD

**Public Summary:**

**Scientific Abstract:**

The optimization of defined growth conditions is necessary for the development of clinical application of human embryonic stem cells (hESCs). Current research has focused on developing defined media formulations for long-term culture of hESCs with little attention on the establishment of defined substrates for hESC proliferation and self-renewal. Presently available technologies are insufficient to address the full complement of factors that may regulate hESC proliferation and maintenance of pluripotency. Here, we report the application of a multifactorial array technology to identify fully defined and optimized culture conditions for the proliferation of hESCs. Through the systematic screening of extracellular matrix proteins (ECMPs) and other signaling molecules, we developed and characterized a completely defined culture system for the long-term self-renewal of three independent hESC lines. In the future, the novel array platform and analysis procedure presented here will be applied toward the directed differentiation of hESCs and maintenance of other stem and progenitor cell populations.

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